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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/580,485	05/30/2000	Shunpei Yamazaki	0756-2154	1593

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EXAMINER
SARKAR, ASOK K

ART UNIT	PAPER NUMBER
2829	

DATE MAILED: 04/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/580,485	YAMAZAKI ET AL.	
	Examiner	Art Unit	
	Asok K. Sarkar	2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/10/2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,8,9,13-20,30,31,33,34 and 36-71* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,8,9,13-20,30,31,33,34 and 36-71* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *30,34,35*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on January 10, 2003 has been entered.

Claim Rejections – 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 8, 31, 41 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang, US 5,684,365 in view of Harvey, US 5,686,360; Kurosawa, US 6,057,647 and Ogura, JP 07,014,678.

Regarding claims 1, 8 and 31, Tang discloses a method of forming TFT-EL display panel using organic electroluminiscent media (see Title) where they disclose:

- forming at least a TFT over an insulating substrate 41 with respect to Figs. 2 and 8;

- forming an insulating film 52 over the TFT with respect to Figs 7 and 8 in column 7, lines 26 – 27;
- forming a pixel electrode 72 over the insulating film 52 and the electrode 72 is connected to the TFT (see Fig. 3) in column 7, lines 16 –25;
- forming an organic EL layer 82 over the pixel electrode in column 7, line 42;
- forming a second electrode 84 over the EL layer (see Fig. 3) in column 9, line 60.

Tang discloses the formation of the EL layer by vapor deposition and suggests that other conventional techniques can be used in column 8, lines 8 – 11. Tang also teaches that the insulating material 52 is preferably silicon dioxide (see column 7, lines 14 – 15) suggesting that other types of insulators can also be used.

Tang fails to disclose that the insulating film is made by forming a first insulating film of an organic resin and a second insulating film of silicon nitride, the EL layer is selectively formed through an ink jet method. Tang also fails to teach that the insulating film is capable of preventing penetration of an alkali metal (functional limitation).

Harvey teaches a method of manufacturing an organic EL device in which a multilayer insulating layer comprising organic resin and silicon nitride (see Fig. 3) in between column 4, line 52 and column 5, line 9 in order to prevent the oxygen and water migration to the organic LEDs.

Kurosawa teaches selective formation of EL layer by an ink jet method in column 7, lines 13 – 19 and in column 15, lines 42.

Ogura teaches that Si_3N_4 can be used as ion barriers for alkali ion diffusion to provide EL element with high reliability (see English abstract).

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Tang's device by replacing the insulating film with a first insulating film of an organic resin and a second insulating film of silicon nitride so that the oxygen and water migration to the organic LEDs are prevented as taught by Harvey and deposit the EL layer by inkjet method since depositing EL layer by the inkjet method will be far less expensive as taught by Kurosawa. Use of silicon nitride as transparent dielectric layer in Tang's device will also prevent the alkali ion diffusion because of the inherent properties of these well known oxides as taught by Ogura.

4. Regarding claims 41 and 42, Tang teaches forming a contact hole with reference to Fig. 8 in the insulating film for connecting the pixel electrode to the TFT in which the upper diameter of the contact hole is longer than the lower diameter of the contact hole. He also teaches forming the pixel electrode on the insulating film where the insulating film is not in contact with the side surface of the pixel electrode is in contact with the side surface of the contact hole and the edge of the insulating film. Although Tang fails to use two layers of insulating film but as explained earlier when Tang's insulating layer is modified with Harvey's multi-layer transparent dielectric, the limitations of these claims will be obvious to one with ordinary skill in the art at the time of the invention.

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tang, US 5,684,365 in view of Harvey, US 5,686,360; Kurosawa, US 6,057,647 and Ogura, JP

07,014,678 as applied to claim 1 above, and further in view of Shimoda, SID 99 Digest, p 376 – 379.

Tang in view of Harvey, Kurosawa and Ogura do not teach the inkjet method using piezo element.

Shimoda in a published article titled "Multicolor Pixel patterning of Light-Emitting Polymers by Ink-Jet Printing" teaches the inkjet method using piezo element in Table 1 in page 377, column 1 under the heading "Ink-Jet machine".

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Tang et al.'s method by depositing the EL layers by inkjet method using a piezo element as taught by Shimoda since such machines are commercially used for ink-jet printing.

6. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tang, US 5,684,365 in view of Harvey, US 5,686,360; Kurosawa, US 6,057,647 and Ogura, JP 07,014,678 as applied to claim 1 above, and further in view of Kobayashi, US 5,680,185.

Tang in view of Harvey, Kurosawa and Ogura do not teach forming one of the pixel electrodes comprising one selected from the group of Mg, Li, Cs, Ba, K, Be and Ca.

Kobayashi teaches forming TFT devices in which the pixel electrodes are made of Al-Mg alloy in column 17, lines 32 – 33.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Tang's method by forming the pixel electrode containing

Mg since these metals are considered low work function metals used as electrodes for LED devices.

7. Claims 2 – 5, 13, 15, 17, 19, 43 – 53, 56 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang, US 5,684,365 in view of Harvey, US 5,686,360; Jones, US 6,337,492 and Kurosawa, US 6,057,647.

Regarding claims 2 – 5, 13, 15, 17, 19, 47, 52 and 53, Tang teaches most of the limitations as have been described earlier in rejecting claim 1.

Tang discloses the formation of the EL layer by vapor deposition and suggests that other conventional techniques can be used in column 8, lines 8 – 11. Tang also teaches that the insulating material 52 is preferably silicon dioxide (see column 7, lines 14 – 15) suggesting that other types of insulators can also be used.

Tang fails to disclose that the insulating film is a layered film made by forming a first insulating film of an organic resin and a second insulating film of aluminum oxide or diamond like carbon (claims 2 and 3), or a first insulating film of silicon nitride or aluminum oxide or diamond like carbon and a second insulating film of an organic resin and a third insulating film of silicon nitride or aluminum oxide or diamond like carbon, the EL layer is selectively formed through an ink jet method.

Harvey teaches a method of manufacturing an organic EL device in which a multi-layer transparent insulating layer comprising organic resin and silicon nitride (see Fig. 3) with the organic film 17 sandwiched between two inorganic films 18 in between column 4, line 52 and column 5, line 9 in order to prevent the oxygen and water migration to the organic LEDs.

Jones teaches a method of forming organic LEDs in which they teach embedding the organic EL layers in between dielectric layers of aluminum oxide and diamond like carbon in column 4, lines 52 – 55.

Kurosawa teaches selective formation of EL layer by an ink jet method in column 7, lines 13 – 19 and in column 15, lines 42.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Tang's device by replacing the insulating film with a multi layered transparent insulating film comprising an organic resin and an inorganic material such as silicon nitride, aluminum oxide or diamond like carbon so that the oxygen and water migration to the organic LEDs are prevented and at the same time transparency is maintained as taught by Harvey and Jones and deposit the EL layer by inkjet method since depositing EL layer by the inkjet method will be far less expensive as taught by Kurosawa.

8. Regarding claims 43 – 46, 48 – 51, 56 and 57, Tang teaches forming a contact hole with reference to Fig. 8 in the insulating film for connecting the pixel electrode to the TFT in which the upper diameter of the contact hole is longer than the lower diameter of the contact hole. He also teaches forming the pixel electrode on the insulating film where the insulating film is not in contact with the side surface of the pixel electrode is in contact with the side surface of the contact hole and the edge of the insulating film. Although Tang fails to use two or three layers of insulating film but as explained earlier when Tang's insulating layer is modified with Harvey's multi-layer

transparent dielectric, the limitations of these claims will be obvious to one with ordinary skill in the art at the time of the invention.

9. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tang, US 5,684,365 in view of Harvey, US 5,686,360; Jones, US 6,337,492 and Kurosawa, US 6,057,647 as applied to claim 2 above, and further in view of Nagao, JP 60,228,821.

Tang in view of Harvey, Jones and Kurosawa do not teach the insulating film of aluminum nitride.

Nagao teaches an antiwear protective film having excellent alkali resistance where the insulating film comprises an element such as B, C, N, Al, Si and also comprises Si, Al, N, O and M where M is Ce, Yb, Sm, Er, Y, La, Gd, Dy and Nd (see the English Abstract).

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Tang's method by forming the insulating film comprising of AlN since AlN is a transparent dielectric material as taught by Nagao and also is an excellent barrier material that will prevent alkali and moisture penetration to the organic LED material for enhanced long-term device stability.

10. Claims 14, 16, 18, 20 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang, US 5,684,365 in view of Harvey, US 5,686,360; Jones, US 6,337,492 and Kurosawa, US 6,057,647 as applied to claims 2 – 5 and 52 above, and further in view of Shimoda, SID 99 Digest, p 376 – 379.

The limitations of these claims have been described earlier in rejecting claim 9.

11. Claims 33, 36, 37, 37 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang, US 5,684,365 in view of Harvey, US 5,686,360; Kurosawa, US 6,057,647 and Ogura, JP 07,014,678 as applied to claim 1 above, and further in view of Kobayashi, US 5,680,185.

The limitations of these claims have been described earlier in rejecting claim 30.

12. Claims 38 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang, US 5,684,365 in view of Harvey, US 5,686,360; Jones, US 6,337,492 and Kurosawa, US 6,057,647 as applied to claims 4 and 5 above, and further in view of Poppal, US 6,283,578.

Tang, US 5,684,365 in view of Harvey; Jones and Kurosawa fails to teach ink-jet printing in dry nitrogen or argon atmosphere.

Poppal teaches that nitrogen can be passed through ink jet printing head to prevent clogging but fails to teach that ink jet printing can be done in dry nitrogen or dry argon atmosphere.

However, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Tang's method by depositing the EL layer by inkjet method with dry nitrogen or other inert gas such as dry argon passing through the head (to prevent head clogging) as taught by Poppal since depositing EL layer by the inkjet method will be far less expensive. The envelop of dry nitrogen or argon atmosphere will also protect the organic EL layers from oxidation and hydrolysis by oxygen and moisture since these organic dyes are very prone to oxidation in air and hydrolysis in the presence of moisture.

13. Claims 58, 59, 62 – 64, 65, 66 and 69 – 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang, US 5,684,365 in view of Harvey, US 5,686,360; Kurosawa, US 6,057,647, Codama, US 6,369,495 and Poppal, US 6,283,578.

Regarding these claims, Tang in view of Harvey, Jones and Kurosawa teaches most of the limitations of the claims as was described earlier in rejecting claims 2 – 5, 13, 15, 17, 19, 43 – 53, 56 and 57.

Similarly, forming EL layer in dry nitrogen and argon atmosphere was taught by Poppal as explained earlier in rejecting claims 38 and 40.

Harvey teaches forming insulating layer of 4 layers with respect to Fig. 3. Harvey also teaches covering the electrode with a fifth inorganic layer 28 in column 5, lines 53 – 62 and with reference to Fig. 3. He also teaches that the second 18, fourth 18 and the fifth 28 can be the same insulating material.

Tang in view of Harvey, Kurosawa and Poppal fails to teach forming a protection electrode over the second electrode.

Codama teaches forming a protection electrode 8 over the second electrode 7 with respect to Fig. 1B in column 5, lines 30 – 45 to protect the organic LEDs and the base electrode from outer atmosphere for improved stability.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Tang's method by depositing four insulating layers over the TFT for better protection of the organic EL layer as taught by Harvey and Jones, deposit the EL layer by ink-jet printing as taught by Kurosawa and employ a protection electrode over the second electrode to protect the EL layer from the other side from

outer atmosphere for improved stability as taught by Codama, use the same inorganic insulating coating over the protection electrode for additional environmental protection as also taught by Harvey and use dry Nitrogen or argon atmosphere to prevent hydrolysis of the organic EL material during ink-jet printing as taught by Poppal.

14. Claims 60 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang, US 5,684,365 in view of Harvey, US 5,686,360; Kurosawa, US 6,057,647; Codama, US 6,369,495 and Poppal, US 6,283,578 as applied to claims 58 and 65 above, and further in view of Shimoda, SID 99 Digest, p 376 – 379.

The limitations of these claims have been described earlier in rejecting claim 9.

15. Claims 61 and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang, US 5,684,365 in view of Harvey, US 5,686,360; Kurosawa, US 6,057,647; Codama, US 6,369,495 and Poppal, US 6,283,578 as applied to claims 58 and 65 above, and further in view of Kobayashi, US 5,680,185.

The limitations of these claims have been described earlier in rejecting claim 30.

Double Patenting

16. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

17. Claims 1 – 5, 8, 9, 13 – 20, 30, 31, 33, 34 and 36 – 71 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 - 24 of U.S. Patent No. 6,239,470 in view of Tang, US 5,684,365; Harvey, US 5,686,360; Kurosawa, US 6,057,647; Ogura, JP 07,014,678; Kobayashi, US 5,680,185; Jones, US 6,337,492; Nagao, JP 60,228,821; Shimoda, SID 99 Digest, p 376 – 379; Codama, US 6,369,495 and Poppal, US 6,283,578. US 6,239,470 teaches an active matrix EL display TFT which can be formed by the methods of the claims of the instant invention and will be it obvious to one with ordinary skill in the art at the time of the invention to modify in view of the teachings of other secondary references as were explained above in rejecting the claims with cited prior arts.

18. Claims 1 – 5, 8, 9, 13 – 20, 30, 31, 33, 34 and 36 – 71 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 - 60 of U.S. Patent No 6,441,468 in view of Tang, US 5,684,365; Harvey, US 5,686,360; Kurosawa, US 6,057,647; Ogura, JP 07,014,678; Kobayashi, US 5,680,185; Jones, US 6,337,492; Nagao, JP 60,228,821; Shimoda, SID 99 Digest, p 376 – 379; Codama, US 6,369,495 and Poppal, US 6,283,578. US 6,239,470 teaches an active matrix EL display TFT which can be formed by the methods of the claims of the instant invention and will be it obvious to one with ordinary skill in the art at the time of the invention to modify in view of the teachings of other secondary references as were explained above in rejecting the claims with cited prior arts.

Conclusion

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 703 308 2521. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kammie Cuneo can be reached on 703 308 1233. The fax phone numbers for the organization where this application or proceeding is assigned are 703 308 7722 for regular communications and 703 308 7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 4918.

Asok K. Sarkar
April 4, 2003

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